46a. Iliofemoral Venous Thrombosis

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A 72-year-old man was admitted in the late evening because of a turgid, white, painful left leg. Over the course of 4 months, he had lost 8 kg of weight (from 82 to 74 kg); his height was 175 cm. There were general symptoms, such as tiredness, slight nausea, lack of appetite and increasing apathy. Over the last 12 h, he had been increasingly confused and aggressive. He had been bedridden for 3 weeks but had refused to see a doctor. There was no history of psychiatric disease, focal cerebrovascular events, ischaemic heart disease, hypertension, intermittent claudication, or venous insufficiency. He had been smoking about 20 cigarettes a day since he was 14 years old, and for many years he had had slight functional dyspnoea, but otherwise no pulmonary symptoms. Stools had been light yellow to grey/white for the last week. His renal function had never been examined, and it had not been noticed whether he had passed urine in the last 24 h. Diazepam was the only medication. The history was provided by his wife, who had called the ambulance. Medical records were not available.

The patient was confused, with delusions; he was intermittently agitated and possibly psychotic, but he could be calmed down. He looked chronically ill, slightly emaciated, possibly anaemic and dehydrated. Temperature and blood pressure (arms) were normal. There was tachycardia with a regular rhythm. The abdomen was slightly distended, but there was neither a palpable mass nor peritoneal reactions. Digital rectal exploration was unremarkable. The right leg was normal with distal pulses.

The left leg had diffuse swelling from the groin to the toes; there was moderate pallor, and no visible varicosities when standing. There was no evidence of superficial thrombophlebitis. Minor venous collaterals were noticed in the groin and just above the inguinal ligament. During palpation over the deep femoral veins, the patient groaned and became increasingly aggressive. The consistency of the calf muscle groups was increased with tenderness but not woody. There was less floppiness of the left leg muscles compared with those of the right. Spontaneous dorsiflexion of the foot was noticed, but sensory function could not be assessed due to lack of patient cooperation.

The quality of the pulses in the groin and knee was good, and the pulse in the dorsal pedal artery was possibly present. Capillary filling in the pulp of the toes
could not be assessed. The plantar pallor did not increase during elevation, but
discrete colour change was noticed at the back of the foot during post-elevation
dependency.
Bladder catheterisation did not produce urine. Electrocardiogram (ECG) was
normal apart from a rate of 114 bpm.

Question 1

What is the most likely diagnosis?

A. Thrombosis of the crural veins.
B. Thrombosis of the femoral veins.
C. Thrombosis of the iliac and femoral veins.
D. Thrombosis of the superficial femoral artery.
E. Thrombosis of the external iliac and superficial femoral arteries.

Blood samples were taken, and the patient was admitted.

Question 2

Which investigation should be ordered and carried out at once?

A. Intravenous arteriography.
B. Intra-arterial arteriography.
C. Ascending phlebography.
D. Colour duplex sonography.
E. Plethysmography.

Due to an unusually large number of emergency admissions, the patient had to
wait several hours before he could be examined by colour duplex sonography and
have his chest X-ray taken. An hour before the scheduled time for these examina-
tions (8 h after admission), and before the results of the blood tests were available,
the patient deteriorated and the pulse rose further. His temperature was now
38.9°C. He had become increasingly agitated and complained of severe pain in the
left leg.
Haemorrhagic bullae developed on the back of the foot and around the medial
ankle, and the skin of the rest of the foot and the distal calf showed numerous
petechiae. There was increased swelling, and the colour of the leg turned deeply
cyanotic, even during elevation. The tips of all the toes were black. A weak pulse
could be felt in the femoral artery in the groin, but distal pulses were absent. The
consistency of the muscle groups of the thigh as well as the lower leg was clearly
increased, and the patient suffered severe pain when femoral muscles were assessed.
by compression. He did not react to pain induced by pinching the skin from the knee and distally. At this point, the right leg exhibited slight but definite swelling, and the skin was beginning to become cyanotic. Pulses could still be felt in the right groin and popliteal artery, but pedal pulses had disappeared.

**Question 3**

What is/are the common name(s) for this clinical presentation?

A. Iliofemoral venous thrombosis.
B. Iliofemoral phlebothrombosis.
C. Phlegmasia alba dolens.
D. Phlegmasia cerulea dolens.
E. Venous gangrene.

**Question 4**

What ideally should have been done, and what should be done at this stage at 4 a.m. on the basis of this clinical presentation and with the additional information provided above?

At this point, the results of the blood tests taken in the emergency room became available: they showed anaemia with haemoconcentration, thrombocytopenia and electrolyte derangements; S-creatinine was 410 mmol/l, and the leucocyte count was 14 times above the upper normal limit. The large amount of fluid sequestered in the gangrenous left leg may account for part of the haemoconcentration.

**Question 5**

Would you consider a surgical thrombectomy at this stage? If so, how would you perform it?

The situation was deemed hopeless and beyond medical therapy. The patient was given intravenous morphine to relieve the pain, and he died 13 h after admission.

**Commentary**

The tentative diagnosis at admission was acute left-sided iliofemoral venous thrombosis with the clinical picture of phlegmasia alba dolens. [Q1: C] It was highly probable – but not proven – that this bedridden patient suffered from active malignant disease with secondary venous thrombosis. His general appearance in connection with the specific signs and symptoms, including apparent lack of urine production, indicated a disaster in progression. The association of cancer and deep venous thrombosis is well established [1]. If a malignancy is definitely diagnosed, or
suspected with a high degree of certainty, disseminated and/or in an advanced stage where expected residual lifespan is very short, then ultrasonically or phlebographically verified iliofemoral venous thrombosis with venous gangrene (ischaemic venous thrombosis) must be interpreted as one of the signs indicating imminent termination of life, and treatment (medical as well as operative) is generally contraindicated, including on compassionate grounds.

With unreliable, rudimentary or uncertain information, it is essential that diagnosis is established not merely as soon as possible but at once; it is not acceptable to wait several hours for the diagnostic test, colour duplex sonography. [Q2: D] The patient should be taken immediately to the ultrasound examination room and, if necessary, scanned by the surgeon. [Q4]

In our case, the colour duplex sonography after a phase of phlegmasia cerulea dolens progressing to manifest venous gangrene on the left side and phlegmasia cerulea dolens in development on the right, showed bilateral thrombosis of both femoral and iliac veins in addition to thrombosis of the inferior vena cava up to and above the renal veins, which explained the lack of urine production. [Q3: E]

Certain assessment algorithms have been devised for the management of this condition [2], but the remotest suspicion of deep venous thrombosis should result either in colour duplex sonography or ascending phlebography (with digital subtraction technique), or in magnetic resonance venography with gadolinium enhancement plus T1 images (bull’s eye sign) [3], if available, in patients with renal impairment or allergy to angiographic contrast media. Some centres have the option of computed tomographic (CT) venography (possibly with spiral/slip-ring technique), which has the additional advantage of being able to visualise extravascular morphology. Plethysmography (strain gauge, impedance, air, etc.) must be considered obsolete for precise diagnosis; isotope uptake tests have generally been disappointing and should be avoided. Both legs, rather than only the symptomatic leg, should be examined in all patients. In patients with coexisting arterial insufficiency of the lower extremities, the diagnosis can be even more difficult, so investigations should be performed at a lower level of clinical suspicion. Where phlegmasia cerulea dolens is surmised, or where venous gangrene is apparent, then one of these examinations must be performed without delay. If pulmonary embolism is suspected, then lung scintigraphy, pulmonary angiography or magnetic resonance or CT scanning of the pulmonary arteries should be performed.

Treatment aims to prevent or decrease further thrombus formation or propagation, to reduce or stop acute (pulmonary embolism) and chronic (post-thrombotic syndrome) complications, and to reduce pain.

In principle, the thrombus can be reduced, or removed, by chemical or mechanical means. A fresh thrombus is generally less adherent than an old thrombus. The preferred treatment of iliofemoral venous thrombosis is heparin administered for 3–4 days as a continued intravenous infusion (high-dose heparin) concomitant with oral phenprocoumon, dicoumarol or warfarin, which should be given for a further 3–6 months [4]. This regime probably has no influence on the development of chronic post-thrombotic syndrome.

Thrombolysis with streptokinase, urokinase or recombinant tissue plasminogen activator (rt-PA) can be attempted for thrombi less than about 10 days old under close monitoring with repeated colour duplex sonography examinations [5–9]. Although many series have been published, the effect on pulmonary embolism is dubious, and the long-term clinical results of properly conducted studies are still poorly documented.
Interruption of the venous system between the thrombus and the heart prevents pulmonary embolism and may be considered in highly selected cases; it is performed by partial or complete occlusion of the inferior caval vein by either open surgery [10] or deployment of temporary or permanent caval filters [11], of which several types are commercially available. The long-term outcomes of both techniques are not clear. The incidence of filter complications – early as well as late – is not negligible.

Once again, as in many other aspects in the treatment of venous disease, there are widely diverging opinions as to the place of surgical thrombectomy of iliofemoral venous thrombosis with or without construction of an arteriovenous fistula. In pregnancy or during puerperium, surgical thrombectomy should not be attempted [12]. A balanced view, based on the available literature, would be that it may be a possibility that could be considered in limb-threatening phlegmasia cerulea dolens [13–17].

The operation is performed with the supine patient in the reversed Trendelenburg position (legs down), and under general anaesthesia with continuous positive airway pressure. The femoral veins, which may bulge with thrombus, and arteries are exposed in the groin by a longitudinal incision. After slings have been applied, a longitudinal phlebotomy is made, and a venous Fogarty catheter is advanced towards the heart. The balloon is inflated, and the catheter is withdrawn together with the thrombus. The procedure is repeated until no more thrombus is delivered. The leg is now elevated, and by manual compression (possibly followed by compressing bandage, e.g. Esmarch’s), one aims to remove the thrombus within the leg. The phlebotomy is then closed. The patient should have the leg elevated until mobilisation after a few days. Thrombectomy often results in incomplete clot removal and recurrence [18].

In certain centres, the contralateral groin vessels are also routinely exposed, a Fogarty catheter is introduced into the common femoral vein, and the tip is positioned in the upper part of the inferior caval vein. The balloon of this catheter is insufflated during the manoeuvres on the contralateral side, and it is retracted with inflated balloon after each of the Fogarty thrombectomy procedures. The aim is to retract fragments of thrombus and avoid (additional) pulmonary embolism.

Some surgeons advocate construction of an arteriovenous fistula in addition to the surgical thrombectomy. The great saphenous vein is transected as appropriate below the saphenofemoral junction, and the distal part of the proximal segment is anastomosed to an arteriotomy in the common femoral artery. The aim is to increase blood flow, thereby reducing the risk of recurrent thrombus formation, in the proximal part of the femoral vein and veins proximal to that. [Q5]

Although the extremity with phlegmasia cerulea dolens may look very bad indeed, a conservative approach is warranted (careful monitoring, elevation of the leg, heparin, fluid replacement). If systemic symptoms or signs occur, or if the situation deteriorates into manifest venous gangrene, then amputation must be performed without delay.

Operative treatment of chronic iliofemoral venous thrombosis and its sequelae, notably post-thrombotic syndrome, remains controversial. Reports with various reconstructions, e.g. with polytetrafluoroethylene (PTFE), remain anecdotal [19].

Endovascular treatment options are emergent, some in combination with open surgery (hybrid procedures). Combined application of transcutaneous thrombectomy devices, balloon angioplasty, stenting etc. with thrombolysis may lead to a
new level of therapeutic aggressiveness [20], but proper scientific documentation is
so far not available, and these new developments must be considered experimental.

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